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A FIELD OPERATIONAL TEST WITH YOUNG VOLUNTEERS DRIVING WITH ISA IN COMBINATION WITH INCENTIVE FOR NOT SPEEDING.

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1 INTRODUCTION

The present study is a part of the Danish ISA project “Pay as You Speed” (www.sparpaafarten.dk). The project is still running and the results reported here stem from a first data collection by April 2007. The general idea of ISA is well known from several previous studies (see Warner, 2006 for a review). With respect to traffic safety informative ISA is a most promising device, provided that drivers do use the system as a support for adhering to the speed limit during driving. If they do not, ISA is just another source of distraction.

In most ISA projects driver motivation has not been an issue; the recruitment of volunteers have proceeded successfully and a substantial effect of informative ISA has been observed in all ISA studies, though it has been reported, that the effect of informative ISA tends to decrease after long term use (Warner, 2006). This finding

suggests that maintenance of the initial positive effect of informative ISA requires maintenance of driver motivation as well.

As researchers of behaviour in traffic, we may, and should, question the reliability of ISA effects measured in previous studies for (at least) two reasons, (1) the general use of volunteers may bias the result, and (2) the almost complete ignorance of driver motivation.

2 THE “PAY AS YOU SPEED” PROJECT

In the “Pay as You Speed” project we tried to deal with the issue of motivation in two different ways; firstly by addressing young drivers, which is a group that has been underrepresented in previous ISA studies and by using an incentive for not speeding in combination with informative ISA. The general idea of “Pay as You Speed” project was to investigate the effect of informative ISA over a 3-year period in an extended road network (the County of North Jutland) including all road types and all speed limits in that road network. In line with other ISA projects “Pay as You Speed” combined the technical verification of an ISA system with a study of the behavioural effects e.g. the impact of the system on speeding.

2.1. Recruitment

The aimed at recruitment of 300 car-owners aged between 18 and 28 years. All car owners (11.400) in the relevant age group were contacted and offered an 30% discount on their car insurance for volunteering (but see below) if they had the ISA equipment installed in their private car for a time period of 3-years. As it turned out, the recruitment of 300 volunteers proved to be impossible; after repeated recruitment campaign in 2005 and 2006 only 50 drivers had accepted to volunteer by September 2006. With this small and probably skewed sample we found it important to consider the possible difference in

attitude to speed and speeding between the volunteers and a control group of non-volunteers from the same population. The control group was recruited among car owners that had not shown any interest in the project after repeated invitations. Letters were sent to a total of 1.973 of those car owners (selected on their day of birth) inviting them to fill in the questionnaire related to the “Pay as You Speed” project and offered them a chance to win a gift voucher for their effort.

3 GENERAL DESIGN

The present study includes two parts; (1) the survey including the volunteers and the external controls (non-volunteers) from the same driver population and (2) a driving experiment in which the volunteers were randomly divided in different ISA treatments (see section 3.2 in this paper). This procedure made it possible to control the relative importance of informative ISA (information) and insurance discount (motivation) for not speeding.

3.1 The questionnaire

After having ISA installed in their car and before having informative ISA switched on the volunteers were required to fill-in a questionnaire. The questionnaire was managed via the project webpage and could be accessed by volunteers by an access code and by the control group by entering their car registration number. The questionnaire addressed a number of issues of which stated driving style, attitude to speed and attitude to ISA will be reported here (but see Harms et al. 2008). The questions were frequently asked questions e.g. replications of questions from other questionnaires including the NHTSA national Survey of Speeding and other unsafe Driving Action, Rätt fart i Borlänge, SARTRE 3, and several others. We used the opportunity of a web-questionnaire to provide the respondents with a continuous scale with a moveable pointer for indicating

their judgement. The resolution of scale values were 400 and with a mid zero-position values ranged from -200 to +200.

3.1.2 Results of the questionnaire A total of 84 questionnaires, 32 from the volunteers and 54 control subjects, were completed. The two groups were quite similar with respect to share of gender, age and the three indicators of driving experience, licence data, duration of car ownership and mileage.

3.1.3 Self reported Driving Style The self reported driving style of volunteers and non-volunteers respectively happened to be quite similar; both groups scored themselves on the positive side on a scale with extremes being contrasts: considerate-inconsiderate, patient-impatient, tolerant-intolerant, attentive-inattentive, calm-annoyed, and safe-risky drivers. As can be seen in Figure 1 the volunteers scored themselves somewhat higher on the positive side than did the non-volunteers. Despite the fact that the between group difference for each individual item was small and none of the differences were found statistically significant, the general tendency e.g. more positive scores in 6 out of 6 items for the volunteer group is actually statistically significant on a sign test ($p < .02$).

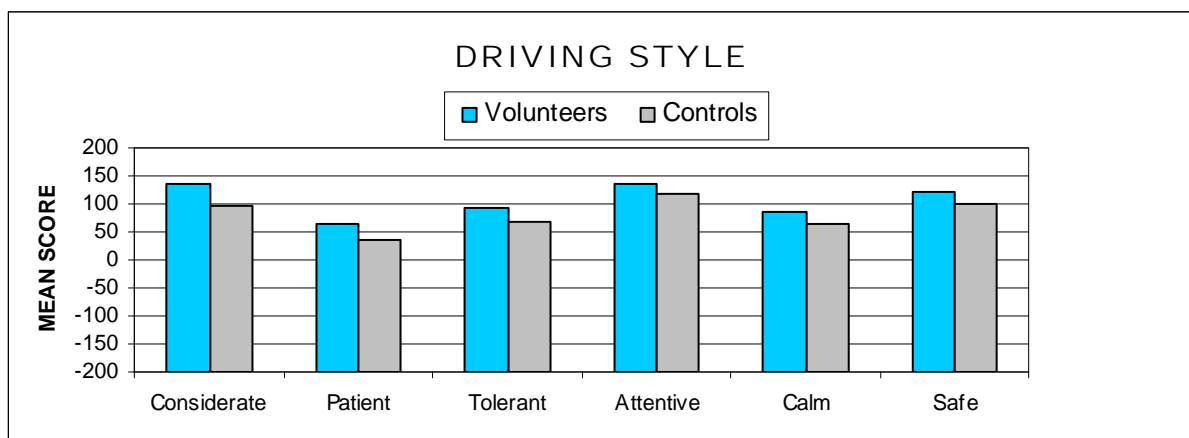


Figure 1. Self Reported Driving Style on a Contrast Scale with Zero as a Neutral Point.

3.1.4 Attitude to speeding and speed limits. The issue of attitude to speeding was approached in several ways (see Harms et al., 2008) including the respondents'

agreement (max. +200) or disagreement (min. -200) with 10 speed statements, that were replications from other surveys. Again the between group difference in the respondents judgements of the statements were not found statistically significant, which is probably due to the small sample size in combination with a considerable variance in the judgements within the two groups.

- (1) *“I enjoy the feel of speed”*
- (2) *“The faster I go the more attentive I am”*
- (3) *“I often get impatient with slow drivers on the road”*
- (4) *“I try to reach my destination as fast as I can”*
- (5) *“It is more important to follow traffic than to comply with speed limits”*
- (6) *“It is a duty of all drivers to comply with speed limits”*
- (7) *“Speed limits are virtually unnecessary in traffic”*
- (8) *“If I am busy I may take a chance in traffic”*
- (9) *“If I was sure of not being caught I would driver faster than I usually do”*
- (10) *“I sometimes feel a pressure in traffic to driver faster than enjoy”*

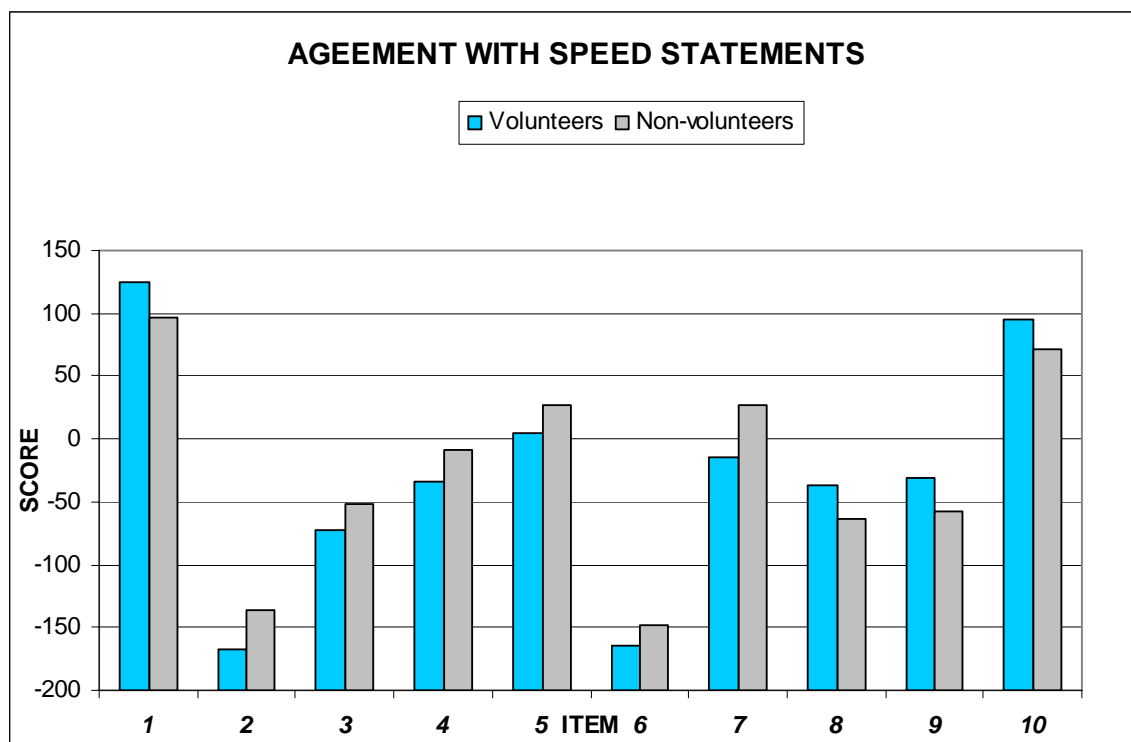


Figure 2. Indication by Group of Agreement (+200) or Disagreement (-200) with the 10 Speed Statements Presented Above.

3.1.5 Assessment of ISA features and of anticipated impact of ISA. ISA-volunteers and external controls differed considerably in their assessment of ISA features. All

differences in Figure 3 were tested with a one-way ANOVA and all differences were found highly significant ($p < .001$) except two: Apparently volunteers and non-volunteers agreed on the negative evaluation of the “heavy” and the “hard” gas pedal, usually associated with interactive and intervening ISA. Expectedly the assessment of the system used in the present project (PAYS-ISA) was more positive for volunteers than for non-volunteers.

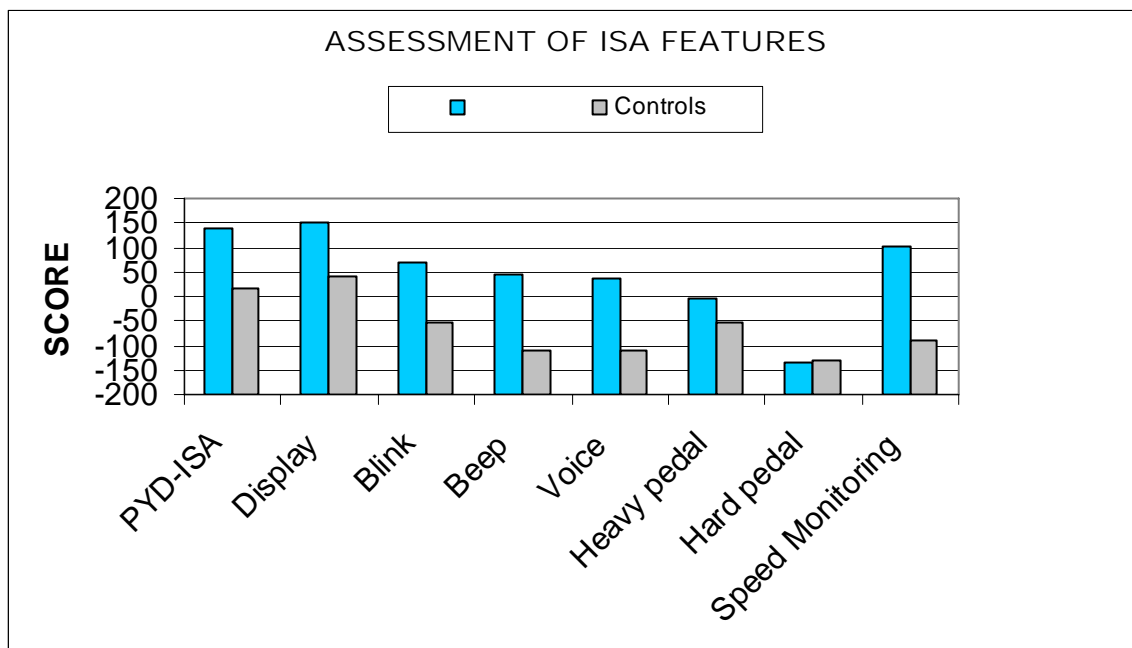


Figure 3. Positive (+200) and Negative (-200) Assessments of ISA-features including assessment of a description of the ISA PAYS system.

Judgements of possible impacts of driving with ISA differed between groups; not surprisingly the scores of ISA volunteers were higher on positive effects and lower on negative effects whereas the pattern of non-volunteers was reversed. The differences between the two groups for each item were tested with a one-way ANOVA and were found significant ($p < .008$) except volunteers and non-volunteers were in agreement with respect to the statement that ISA could annoy other drivers.

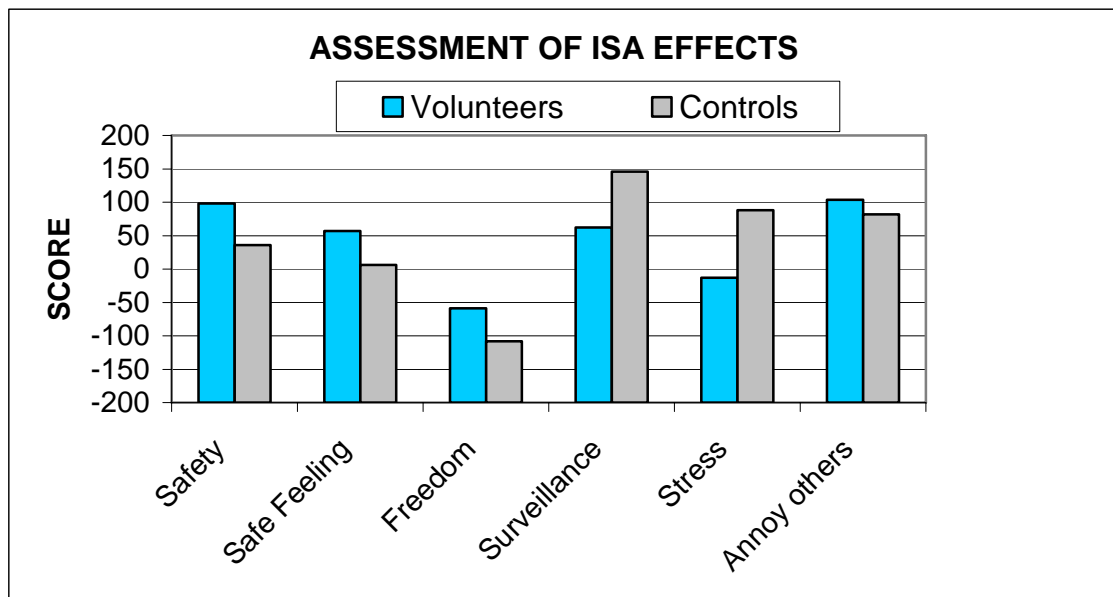


Figure 4. Assessment of possible changes, Increase (+200) and Decrease (-200), associated with Driving with informative ISA.

3.1.6 Discussion of questionnaire results. As it turned out the volunteers and the non-volunteers were quite similar with respect to their stated driving style and their attitudes to speeding. On the contrary the two groups differed in their assessment of ISA-features and anticipated effects of driving with ISA with few exceptions: The volunteers and non-volunteers were consistent in their negative judgement of the active gas pedal concept and in anticipating that driving with ISA could annoy other drivers. Not surprisingly volunteers were more positive to ISA-features than were non-volunteers and they anticipated more positive effects of driving with ISA. It is worth noticing, however, that non-volunteers were neutral, rather than negative, in their judgement of (the description of) ISA-system, which was actually used in the present project (see Figure 3.).

3.2 The Driving Experiment

The impact on speeding of informative ISA was controlled by submitting ISA volunteers to different treatments. The volunteers were randomly allocated to 4 groups with incentive for not-speeding/incentive for volunteering as one factor and informative

ISA/inactive ISA as the other factor. Thus the 4 groups were: A *control group* with full insurance discount and no ISA information (the system was installed but it was not used for informing the driver), a *information group* with informative ISA and full insurance discount, an *incentive group*, for which insurance discount were reduced for speeding and no ISA information (the system was installed but it was not used for informing the driver), a *combination group* that was both provided with ISA information and had their insurance discount reduced for speeding. In this project informative ISA consisted of a display showing the current speed limit in combination with a voice message in case of speeding. All volunteers had the display and the voice message switched off during the first 1 ½ month after the instalment of the ISA equipment. The next 4 ½ month served as experimental period with participants randomly assigned to one out of 4 predefined ISA treatments.

3.2.2 The effect on speeding of different ISA-Treatments. Analysis of the effect of ISA on speeding was calculated across speed limits from 40 to 130 km/t and included a total of approximately 180.000 kilometres. The number of kilometres driven below and above the activation level of the ISA-system were summarised by week, subject and speed limit over 18 consecutive weeks of driving. The analysis of change in the subjects speeding behaviour included 3 periods; week 1-6 was the test phase (TEST) in which the ISA equipment was switched off. ISA effects are estimated separately over two consecutive 6 week periods, the early one including week 8-13 (ISA1) and the later one including week 14-19 (ISA2). Week 7 was excluded from the analysis since the ISA equipment was switched on in that week. The analysis was based on 31 volunteers, eight from the control group, seven from the incitement group, seven from the information group and nine from the combination group. All the subjects had speed registrations in all three periods and one subject with missing data from a full 6-week period was excluded from the analysis.

The effect of treatment was estimated by calculating the percentage of the total distance driven, driven at a higher speed than the activation level of the ISA system (limit+5). In order to prevent the difference between subjects in total amount of kilometres driven from affecting the effect size the share of speeding was calculated for each subject individually prior to calculating the group average.

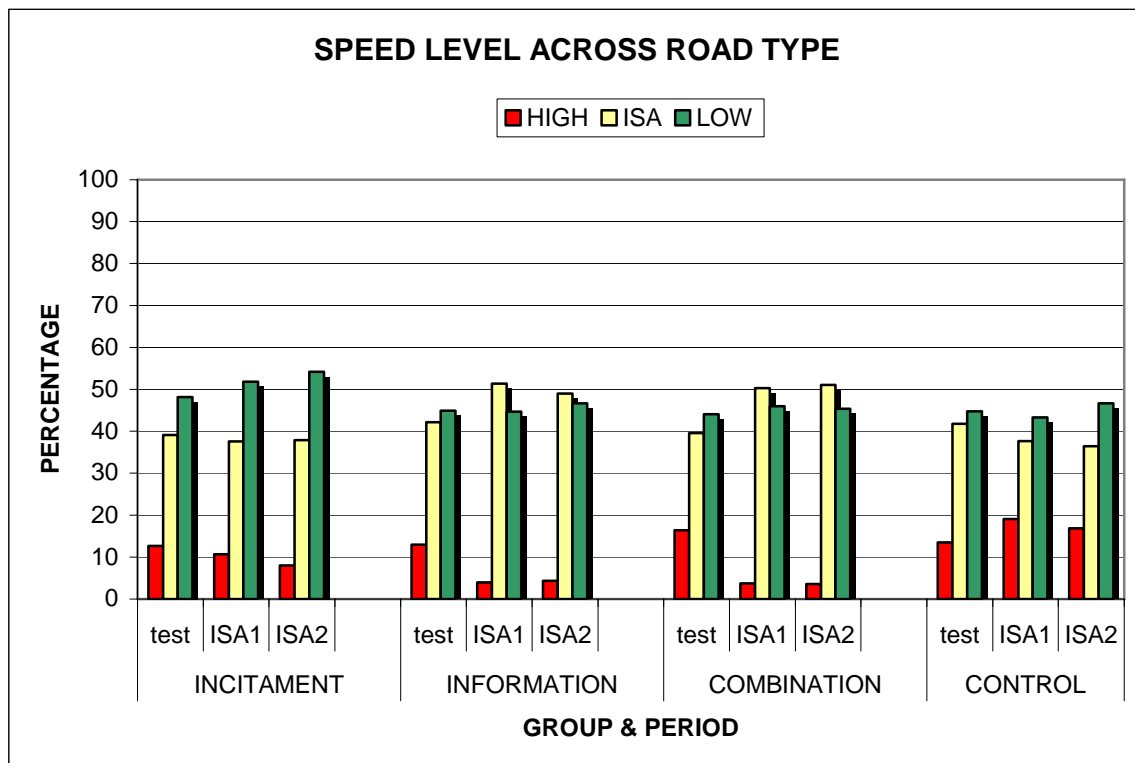


Figure 5. Percentage of Kilometres Driven at a Speed above the Activation Level of the ISA System for each Group without ISA Switched on (TEST) and in the first (ISA1) and the second (ISA2) 6-week period after ISA had been switched on.

Figure 5 suggests that the share of kilometres driven with a speed over the activation of the ISA system (limit+5) decreased for the two ISA-equipped groups being encouraged not to exceed the activation level of the system. A two-way ANOVA supported this; the main effect of group was statistically significant ($F=67.9$ $df=3,3.450$, $p<.000$) and so was the effect of period ($F=44.6$ $df=2,3.450$, $p<.000$) a significant interaction between these two factors ($F=24.6$ $df=6,3.450$, $p<.000$) suggested that the effect of treatment differed between groups and subsequent pair wise comparison of the 4 groups revealed that the

difference between the information group and the combination group were not statistically significant. Similarly a pair wise comparison of the three period suggested that the TEST period differed from the two ISA periods (ISA1 and ISA2), whereas the difference between ISA periods was not statistically significant. A subsequent one-way ANOVA was used for comparing speeding over period within each treatment group. The difference in speeding between the test period and the two ISA periods for the “information” and for the “combination” group were confirmed (both: $p = .0005$) with no difference between the two ISA periods. Moreover the speeding of the incentive group was actually found to change between the test period (TEST) and the later ISA period (ISA2) ($p = .0002$). The observed change in the speeding of control group between time periods was not found statistically significant.

3 A CONCLUDING REMARK

Obviously the present study is too small to draw firm conclusions. Considering the difficulty with recruitment of volunteers it is a “nice” finding that the, probably well motivated volunteers, who did not receive ISA information and did not have their insurance discount reduced for speeding, did not change their amount of speeding while all the other groups did. The difficulty we met in the recruitment of volunteers for the “Pay as You Speed” project has not been reported in other studies. We may attribute the difficulty to a variety of factors including that young drivers are harder to recruit for ISA projects than are more mature drivers. It is striking, that the number of young drivers is very small in most ISA projects. Moreover few ISA projects, up till now, have had a high number of subjects suggesting that their samples are not representative ones. Unfortunately, provided that a substantial part of the driver population has a negative

attitude to using ISA we may be concerned about “disuse” of ISA and in turn limited safety effects of ISA.

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